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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/792,368	KAYE ET AL.	
	Examiner	Art Unit	
	Jason M. Repko	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 5/29/2007.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-52 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-52 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 02 May 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. The limitations recited in claims 1-17 are not supported in 09/085,746, 09/819,420, 10/029,625, and 10/147,380, and therefore do not receive the benefit of the earlier filing date. The limitations recited in claims 37, 41-43 and 51-52 are not supported in 09/085,746, and therefore do not receive the benefit of the earlier filing date. The limitation "scaling depth and/or hidden surface area reconstruction information associated with the three-dimensional images...to control exaggerated depth effects caused by changes..." appearing in claims 28-52 is not supported in 09/085,746, 09/819,420, 10/029,625, and 10/147,380, and therefore does not receive the benefit of the earlier filing date.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,031,564 to Ma et al. in view of U.S. Patent No. 6,765,568 to Swift et al. in view of U.S. Patent No. 6,005,607 to Uomori et al.

6. With regard to claim 1, Ma et al. discloses creating "a three-dimensional image converted from two-dimensional images" (*lines 65-67 of column 2: "Stereoscopic images require two slightly offset perspective images in order to create a stereoscopic presentation with the appearance of depth"; lines 8-11 of column 3: "A system of techniques of shifting and warping objects within the first image can be implemented to automate the generation of the second perspective image. "*) and using "depth information" to create a second perspective image offset from the first to "to present the three-dimensional image." in lines 20-25 of column 5:

> *The amount of the shift may be based, for example, on the computed depth as shown in FIG. 2, which shows the relationship between the distance from the eyes, y, versus the amount of relative shift, Δ, at any horizontal point x for a fixed focus distance of 45 inches and an eye separation distance of 3 inches. One should note that this position-offset distance saturates rapidly as the depth becomes farther away.*

7. Ma et al. does not expressly disclose scaling to control exaggerated depth effects. Swift et al. discloses "a method for providing depth accurate three-dimensional images converted from two-dimensional images, comprising:

a. selecting a screen size of a three-dimensional image to be reproduced on; scaling stereo media to control exaggerated depth effects caused by changes to the size of the

three-dimensional image by preserving perceived depths of the objects when the three-dimensional image is presented on the screen size selected (*lines 53-63 of column 8: "Another embodiment automatically (or manually if desired) adjusts with overall left and right image shift to compensate for image magnification. When a 3D stereoscopic image is enlarged and displayed on a viewing system that has a larger image size then the target system, there is a potential of creating large separations between objects in the 3D stereoscopic image that can lead to eyestrain for the viewer... When the 3D stereoscopic image is to be displayed on a display that is larger or smaller than the target screen size, then the 3D stereoscopic image is adjusted accordingly to minimize eye fatigue for the user."; lines 6-12 of column 6: "Since the format of the original left and right is known, as designated by the tag within the Stereoscopic 3D Media file, the scaling can be done while preserving stereo. The system will look at the storage method used, and then take the appropriate actions to scale the media while preserving the stereo. Scaling may done to increase or decrease the display size of the stereoscopic media. "*).

8. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to appropriately scale the depth information disclosed in Ma et al. according to a display size as taught by Swift et al. to obtain the advantage of preserving proper stereo under different viewing conditions. Therefore, it would have been obvious to combine Swift et al. with Ma et al. to obtain the invention specified in claim 1.

9. Swift et al. does not disclose a expressly disclose "range of screen sizes." Uomori et al. discloses preserving perceived depths of the objects when the three-dimensional image is presented within a range of screen sizes (*lines 54-65 of column 14: "FIG. 22 shows the*

relationship between the screen size (viewing angle) for displaying stereoscopic images and the maximum fusional parallax (expressed in angles, unit being [arc min]). It is shown that the allowable binocular fusional range changes as the display screen size changes. A larger screen size provides a larger fusional range. Accordingly, when the window size is reduced while the window is displaying the same stereoscopic image, the resulting parallax may exceed the binocular fusional range; therefore, the sizes of all the windows must be monitored constantly, and the camera parameters must always be determined accordingly."). In Uomori et al., the user is permitted to change the display screen size (*lines 52-54 of column 14*), but as shown in Figure 22 the parallax computed may fall within the fusional range over a range of screen sizes (i.e. within –50 to 50 arc min for the range of 4 to 14 degrees). Furthermore, Uomori et al. discloses adjusting the camera parameters when the resulting parallax exceeds the binocular fusional range.

10. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate the step of selecting a range of screen sizes when the parallax computed is known to be within a fusional range over the selected range of screen sizes or when the variation of the fusional range is not significant over the selected range of screen sizes. The motivation for doing so would have been to eliminate the need to recalculate the stereo pairs when the display size is changed within the range, which is more efficient as it increases the number of instances a particular computation is relevant. Therefore, it would have been obvious to further modify the combination of Ma et al. and Swift et al. with Uomori et al. to obtain the invention specified in claim 1.

11. With regard to claims 2 and 3, Swift et al. further discloses scaling up and scaling down stereo media (*lines 12-13 of column 6: " Scaling may done to increase or decrease the display size of the stereoscopic media."*).

12. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the scaling up and down as taught by Swift et al. in the system and method disclosed by Ma et al. to obtain the advantage of preserving proper stereo effect under different viewing conditions. Therefore, it would have been obvious to further modify the combination of Ma et al. and Swift et al. to obtain the invention specified in claims 2 and 3.

13. With regard to claim 4, Swift et al. further discloses scaling using an interactive user interface configured to allow a user of the interactive user interface to view a representation of the three-dimensional image during the scaling of stereo media (*lines 40-44 of column 8: "FIG. 12 illustrates a cross-eye viewing mode. For cross-eye viewing, it is possible to use larger images than with the parallel viewing method. There is still a limit where many users will begin to experience eyestrain. The user can be queried to determine the limits of cross-eye viewing. "*). Ma et al.

14. With regard to claim 5, Swift et al. further discloses the stereo media is at least partially automatically scaled depending on the screen size selected (*lines 35-39 of column 8 (emphasis added): "Since most computer operating systems now store information on the width 1108 of the monitor image on the display monitor, it is possible to automatically adjust the spacing and size of the right and left images to avoid eyestrain."*).

15. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to further incorporate a user interface and automatic scaling as disclosed by Swift et al. to

obtain the advantage of preserving proper stereo under different viewing conditions in a manner most convenient to the user. Therefore, it would have been obvious to further modify the combination of Ma et al. and Swift et al. to obtain the invention specified in claims 4 and 5.

16. **Claims 6-11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,031,564 to Ma et al. in view of U.S. Patent No. 6,765,568 to Swift et al. in view of U.S. Patent No. 6,005,607 to Uomori et al. in view of U.S. Patent No. 6,266,068 to Kang et al.**

17. With regard to claim 6, Swift et al. discloses scaling stereo media for a predetermined screen size (*lines 53-63 of column 8; lines 6-12 of column 6*). The combination of Ma et al., Swift et al. and Uomori et al. does not disclose "hidden surface reconstruction information associated with hidden surface areas in the three-dimensional image" Kang et al. discloses "hidden surface reconstruction information associated with hidden surface areas in the three-dimensional image" (*lines 16-25 of column 9: "As with IBR of a single input layer, multiple layer IBR may produce gaps of unspecified pixel values in the output virtual view 120. Such gaps may result from disocclusion (i.e., previously occluded object portions become visible in the new output virtual view) or from mapping pixels from small pixel areas to large pixel areas..."; lines 47-53 of column 9: "For gaps resulting from disocclusion, the correct layer for providing each missing pixel value needs to be determined from the set of input layers because the missing pixel values are not available from the composite images. In one embodiment, an epipolar search process is applied to each input layer in the set of layers to find the correct layer for providing a missing pixel value."*).

18. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate hidden surface reconstruction information as taught by Kang et al. Since the scaling and shifting of the second perspective image with respect to the first introduces holes into the second image, it would have been obvious to a person of ordinary skill in the art to scale the reconstructed areas described by Kang et al. when the stereo media is scaled to accommodate proper stereo viewing as taught by Swift et al. The motivation for filling gaps and scaling reconstruction information would have been to improve the aesthetic quality of the final image. Therefore, it would have been obvious to modify the combination of Ma et al., Swift et al., and Uomori et al. with Kang et al. to obtain the invention specified in claim 6.

19. Claims 7-10 recite limitations similar in scope to those recited in claims 2-5, respectively. These limitations were shown to be met by the combination of Ma et al., Swift et al., Uomori et al. and Kang et al. Claims 7-10 are rejected with the rationale of claims 2-5.

20. Claims 11 and 12 recite limitations similar in scope to those of claims 1 and 6, respectively, which are met by the combination of Ma et al., Swift et al., Uomori et al. and Kang et al.: scaling depth information (recited in claims 1 and 11) or hidden surface reconstruction information (recited in claim 6 and 12) converted from a two-dimensional image; and using the scaling depth information or hidden surface information to present the three dimensional image and to preserve perceived depths of objects within the three-dimensional image when the three-dimensional image is presented within a particular range of screen sizes. In addition, claims 11 and 12 recite a "machine-readable data file." Official Notice is taken that both the concept and the advantages of providing "machine-readable data file" for storing data associated with the production of a three-dimensional image are well known and expected in the art. It would have

been obvious to have included "machine-readable data file" in Ma et al. as "machine-readable data files" are known to provide a computationally efficient way to store three-dimensional image data for subsequent computations, to obtain the benefit of not having to repeat computations each time an three-dimensional image is presented. Therefore, it would have been obvious to modify the combination of Ma et al., Swift et al., Uomori et al. and Kang et al. to obtain the invention specified in claims 11 and 12.

21. **Claims 13-16, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,031,564 to Ma et al. in view of U.S. Patent No. 6,266,068 to Kang et al. in view of U.S. Patent No. 6,765,568 to Swift et al.**

22. With regard to claim 13, Ma et al. discloses "converting a two-dimensional image into a three-dimensional image" (*lines 65-67 of column 2*) and using "depth information" to create a second perspective image offset from the first to "to present the three-dimensional image." in lines 20-25 of column 5.

23. With regard to claim 13, Ma et al. does not expressly disclose "hidden surface reconstruction information associated with hidden surface areas in the three-dimensional image." Kang et al. discloses "hidden surface reconstruction information associated with hidden surface areas in the three-dimensional image" (*lines 16-25 of column 9: "As with IBR of a single input layer, multiple layer IBR may produce gaps of unspecified pixel values in the output virtual view 120. Such gaps may result from disocclusion (i.e., previously occluded object portions become visible in the new output virtual view) or from mapping pixels from small pixel areas to large pixel areas..."; lines 47-53 of column 9: "For gaps resulting from disocclusion, the correct layer for providing each missing pixel value needs to be determined from the set of input layers*

because the missing pixel values are not available from the composite images. In one embodiment, an epipolar search process is applied to each input layer in the set of layers to find the correct layer for providing a missing pixel value.").

24. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate hidden surface reconstruction information as taught by Kang et al. The motivation for doing so would have been to improve the aesthetic quality of the final image. Therefore, it would have been obvious to modify Ma et al. with Kang et al. to obtain the invention specified in claim 13.

25. With regard to claim 13, Ma et al. does not expressly disclose "scaling the depth and hidden surface area reconstruction information to preserve perceived depths of objects or other image components within the three-dimensional image when the three-dimensional image is presented at a particular screen size, multiple screen sizes, or within a particular range of screen sizes." Swift et al. discloses "scaling the depth information to preserve perceived depths of objects or other image components within the three-dimensional image when the three-dimensional image is presented at a particular screen size, multiple screen sizes, or within a particular range of screen sizes" (*lines 53-63 of column 8; lines 6-12 of column 6*).

26. Since the scaling and shifting of the second perspective image with respect to the first introduces holes into the second image, it would have been obvious to a person of ordinary skill in the art to scale the reconstructed areas described by Kang et al. when the stereo media is scaled to accommodate proper stereo viewing as taught by Swift et al. The motivation for doing so would have been to further improve the aesthetic quality of the final image. Therefore, it

would have been obvious to further modify the combination of Ma et al. and Kang et al. with Swift et al. to obtain the invention specified in claim 13.

27. Claim 14 is met by the combination of Ma et al., Kang et al. and Swift et al., wherein Swift et al. discloses "the scaling is performed on an image used to create the three-dimensional image" (*lines 58-62 of column 3: "As shown in FIG. 1 with analysis 10, the left and right media are extracted from the Stereoscopic 3D Media file 12, scaled, recombined into the selected display method, then the resulting scaled Stereoscopic Media is displayed."*).

28. With regard to claim 15, Swift et al. further discloses scaling using an interactive user interface configured to allow a user of the interactive user interface to view a representation of the three-dimensional image during the scaling of stereo media (*lines 40-44 of column 8: "FIG. 12 illustrates a cross-eye viewing mode. For cross-eye viewing, it is possible to use larger images than with the parallel viewing method. There is still a limit where many users will begin to experience eyestrain. The user can be queried to determine the limits of cross-eye viewing. "*).

29. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to further incorporate a user interface and automatic scaling as disclosed by Swift et al. to obtain the advantage of preserving proper stereo under different viewing conditions when the user wishes to do so. Therefore, it would have been obvious to further modify the combination of Ma et al., Kang et al. and Swift et al. to obtain the invention specified in claim 15.

30. Claim 16 is met by the combination of Ma et al., Kang et al. and Swift et al, wherein Swift et al. discloses "the scaling is performed on a lower resolution version of an image used to create the three dimensional image" (*lines 12-13 of column 6 (emphasis added): "Scaling may done to increase or decrease the display size of the stereoscopic media."*). One of ordinary skill

in the art would recognize that the input to a process that scales an image by increasing the size is of lower resolution than the output.

31. With regard to claim 25, Ma et al. discloses creating "a method for providing depth accurate three-dimensional images converted from two-dimensional images (*lines 65-67 of column 2: "Stereoscopic images require two slightly offset perspective images in order to create a stereoscopic presentation with the appearance of depth."*), comprising: receiving or accessing image data (*Fig. 1*) using the image data to reproduce a three dimensional image (*lines 30-31 of column 7: "Finally, the sequence of stereoscopic images is displayed at step 70."*). Ma et al. does not disclose, "the three-dimensional conversion information includes hidden surface reconstruction information." Kang et al. discloses "hidden surface reconstruction information associated with hidden surface areas in the three-dimensional image" (*lines 16-25 of column 9*; *lines 47-53 of column 9:*).

32. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate hidden surface reconstruction information as taught by Kang et al. in the method and system disclosed by Ma et al. The motivation for doing so would have been to improve the aesthetic quality of the final image.

33. The combination of Ma et al. and Kang et al. does not expressly disclose scaling hidden surface area reconstruction information. Swift et al. discloses scaling image data associated with a three-dimensional image to control exaggerated depth effects caused by changes to the size of the three-dimensional image by preserving perceived depths of objects or other image components within the three-dimensional image when the three-dimensional image is presented

at a particular screen size, multiple screen sizes, or within a particular range of screen sizes (*lines 53-63 of column 8; lines 6-12 of column 6*).

34. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to appropriately scale the depth information disclosed in Ma et al. and hidden surface reconstruction information as disclosed in Kang et al. according to a display size to obtain the advantage of preserving proper stereo under different viewing conditions. Therefore, it would have been obvious to combine Swift et al. with Ma et al. and Kang et al. to obtain the invention specified in claim 25.

35. Claim 26 is met by the combination of Ma et al., Kang et al. and Swift et al., wherein Ma et al. discloses "using the image data to reproduce the three-dimensional image includes displaying the three-dimensional image" (*lines 30-31 of column 7: "Finally, the sequence of stereoscopic images is displayed at step 70."*).

36. **Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,031,564 to Ma et al. in view of U.S. Patent No. 6,266,068 to Kang et al. in view of U.S. Patent No. 6,765,568 to Swift et al. in view of U.S. Patent No. 5,568,595 to Yosefi et al.**

37. As shown in the rejection of claim 15, the combination of Ma et al., Kang et al. and Swift et al. show "the scaling is performed at an interactive user interface configured to allow a user of the interactive user interface to view the three-dimensional image during the scaling." Ma et al. discloses an interactive user interface in lines 15-16 of column 6 and lines 44-48 of column 6. However, the combination does not show "allowing a user of the interactive user interface to view a lower resolution of the three-dimensional image during the scaling."

38. Yosefi et al. discloses applying processing to a low resolution image to allow the operator to preview the results of a processing (lines 12-20 of column 4):

> *There is also provided, in accordance with another preferred embodiment of the present invention, apparatus for generating artificial shadow including a user input module operative to receive at least one user-selected characteristic of an artificial shadow for an imaged object, and a low resolution preview generator operative to automatically provide a low resolution preview of the imaged object together with an artificial shadow having the at least one user-selected characteristic.*

39. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate a low resolution preview as disclosed by Yosefi et al. in the method and system disclosed by the combination of Ma et al., Kang et al. and Swift et al. The motivation for doing so would have been to allow the user to interact with and apply processing to an image in a computationally efficient manner. Therefore, it would have been obvious to further modify the combination of Ma et al., Kang et al. and Swift et al. with Yosefi et al. to obtain the invention specified in claim 17.

40. **Claims 18-20, 22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,031,564 to Ma et al. in view of U.S. Patent No. 5,568,595 to Yosefi et al.**

41. With regard to claim 18, Ma et al. discloses "a method for providing depth accurate three-dimensional images converted from two-dimensional images (*lines 65-67 of column 2: "Stereoscopic images require two slightly offset perspective images in order to create a stereoscopic presentation with the appearance of depth."*), comprising: processing images to

determine three-dimensional conversion information (*lines 8-11 of column 3: "A system of techniques of shifting and warping objects within the first image can be implemented to automate the generation of the second perspective image."*); applying the three-dimensional conversion information to image create three-dimensional images (*lines 28-32 of column 5: "One should note that this position offset distance saturates rapidly as the depth becomes farther away. A more generalized equation was derived to calculate Δ, the amount of shift required for the right (i.e., second) perspective image from the left (i.e., first) perspective image at any particular depth relative to the width of the viewing screen, with reference to FIG. 3."*).

42. Ma et al. does not disclose "scaling down higher resolution image to generate lower resolution images," "processing the lower resolution images," and "applying information to the higher resolution images."

43. Yosefi et al. discloses "scaling down higher resolution image to generate lower resolution images" (*lines 38-41 of column 8: "Step 300: A low resolution representation of the high resolution image selected in step 110 of FIG. 2 is generated, stored in local memory 80 of FIG. 1, and displayed on the screen 90 of FIG. 1. "*) "processing the lower resolution images," (*lines 14-18 of column 9: "Steps 420, 430, 440 and 441 implement step 150 of FIG. 2 by modifying the low resolution image generated in step 300 by adding thereto an artificially generated shadow, in low resolution, having the currently defined shadow parameters."*) and "applying information to the higher resolution images" (*lines 18-22 of column 10: "In step 460, step 160 of FIG. 2 is implemented by modifying the high resolution image selected in step 110 of FIG. 2, by adding thereto an artificially generated shadow in high resolution, having the currently defined shadow parameters."*).

44. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate a low resolution preview as disclosed by Yosefi et al. in the method and system disclosed by Ma et al. The motivation for doing so would have been to allow the user to interact with and apply processing to an image in a computationally efficient manner. Therefore, it would have been obvious to combine Ma et al. with Yosefi et al. to obtain the invention specified in claim 18.

45. With regard to claims 19 and 20, Yosefi et al. discloses "scaling down an image" to a lower spatial resolution; however, Yosefi et al. does not expressly disclose a "smaller file size." Official Notice is taken that both the concept and the advantage of providing scaling down includes reducing an image file size and number of pixels of the higher resolution images to generate the lower resolution images are well known and expected in the art. It would have been obvious to have included the step of scaling down includes reducing an image file size and number of pixels of the higher resolution images to generate the lower resolution images in the combination of Yosefi et al. and Ma et al. as the lower resolution image requires less pixel values than the higher resolution image and therefore would require a smaller memory footprint and would improve system resource usage.

46. Claim 22 is met by the combination of Ma et al. and Yosefi et al., wherein Ma et al. discloses "the three-dimensional conversion information includes depth perspective information" (*lines 28-32 of column 5: "One should note that this position offset distance saturates rapidly as the depth becomes farther away. A more generalized equation was derived to calculate $\dot{\Delta}$, the amount of shift required for the right (i.e., second) perspective image from the left (i.e., first)*

perspective image at any particular depth relative to the width of the viewing screen, with reference to FIG. 3.").

47. With regard to claim 24, Yosefi et al. further discloses the shadow information is scaled up before it is applied to the higher resolution images (*lines 18-22 of column 10: "In step 460, step 160 of FIG. 2 is implemented by modifying the high resolution image selected in step 110 of FIG. 2, by adding thereto an artificially generated shadow in high resolution, having the currently defined shadow parameters."*).

48. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to scale up the three-dimensional conversion information disclosed by Ma et al. The motivation for doing so would have been to establish a proper correspondence between the high-resolution image and the conversion information. Therefore, it would have been obvious to further modify the combination of Ma et al. and Yosefi et al. to obtain the invention specified in claim 24.

49. **Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,031,564 to Ma et al. in view of U.S. Patent No. 5,568,595 to Yosefi et al. in view of U.S. Patent No. 5,929,859 to Meijers.**

50. With regard to claim 21, the combination of Ma et al. and Yosefi et al. disclose the limitations of parent claim 18, but does not disclose "reducing a color depth size." Meijers discloses "scaling down includes reducing a color depth size of the higher resolution images to generate the lower resolution images" (*lines 24-27 of column 6: "The pixel value may be stored in full, e.g. using 16 or 24 bits per pixel. Alternatively, a Colour Look-Up Table (CLUT) scheme may be used to code the pixel value using less bits, e.g. 8 bits."; lines 43-48 of column 16: "To*

reduce storage requirements for storing pixel values, the pixel values may be encoded using a Colour Look-Up Table (CLUT) scheme. If so, the decoding is, preferably, performed before mixing the pixels. To this end, the processor 530 comprises a CLUT 670 for performing the decoding. ")

51. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate the step of reducing color depth as disclosed by Meijers in the low resolution preview disclosed by Yosefi et al. The motivation for doing so would have been to further "reduce storage requirements for storing pixel values" as disclosed by Meijers in lines 24-27 of column 6. Therefore, it would have been obvious to further modify the combination of Ma et al. and Yosefi et al. with Meijers to obtain the invention recited in claim 21.

52. **Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,031,564 to Ma et al. in view of U.S. Patent No. 5,568,595 to Yosefi et al. in view of U.S. Patent No. 6,266,068 to Kang et al.**

53. With regard to claim 23, Ma et al. does not disclose, "the three-dimensional conversion information includes hidden surface reconstruction information." Kang et al. discloses "hidden surface reconstruction information associated with hidden surface areas in the three-dimensional image" (*lines 16-25 of column 9: "As with IBR of a single input layer, multiple layer IBR may produce gaps of unspecified pixel values in the output virtual view 120. Such gaps may result from disocclusion (i.e., previously occluded object portions become visible in the new output virtual view) or from mapping pixels from small pixel areas to large pixel areas..."; lines 47-53 of column 9: "For gaps resulting from disocclusion, the correct layer for providing each missing pixel value needs to be determined from the set of input layers because the missing pixel values*

are not available from the composite images. In one embodiment, an epipolar search process is applied to each input layer in the set of layers to find the correct layer for providing a missing pixel value.").

54. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate hidden surface reconstruction information as taught by Kang et al. in the system and method disclosed by Ma et al. and Yosefi et al. The motivation for doing so would have been to improve the aesthetic quality of the final image. Therefore, it would have been obvious to further modify the combination of Ma et al. and Yosefi et al. with Kang et al. to obtain the invention specified in claim 23

55. Claims 27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,031,564 to Ma et al. in view of U.S. Patent No. 6,266,068 to Kang et al. in view of U.S. Patent No. 6,765,568 to Swift et al. in view of U.S. Patent No. 5,481,321 to Lipton.

56. With regard to claim 27, the combination of Ma et al., Kang et al. and Swift et al. shows the limitations of parent claim 25. With regard to claims 28 and 29, the combination of Ma et al., Kang et al. and Swift et al. discloses the limitations recited on lines 1-8 of claim 28, as shown with regard to claim 25. With regard to claims 27-29, the combination of Ma et al., Kang et al. and Swift et al. does not disclose "projecting the three-dimensional image," as recited in.claim 27, "projecting the three-dimensional image on movie screens," as recited in claim 28, "the three-dimensional images are projected using film media," as recited in claim 29. Lipton discloses "projecting the three-dimensional image," as recited in claim 27, "projecting the three-dimensional image on movie screens," as recited in claim 28, "the three-dimensional images are projected using film media," as recited in claim 29 (*lines 55-61 of column 6: " FIG. 1 shows the*

layout of the above-and-below format on 35 mm film. This has become the accepted approach in the film industry for projection of stereoscopic motion pictures. Table 1 (of FIG. 1(a)) gives the specific dimensions for a "symmetrical" version of the above-and-below format. Table 2 (of FIG. 1(b)) gives the specific dimensions for an "asymmetrical" version of the above-and-below format."; lines 52-53 of column 16: "The motion picture image is projected onto screen 213.").

57. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to reproduce the three-dimensional image created by the system disclosed by the combination of Ma et al., Swift et al. and Kang et al. by projecting it on a movie screen from film media. The motivation for doing so would have been to create a feature film capable of being viewed in a movie theater. Therefore, it would have been obvious to combine the combination of Ma et al., Swift et al. and Kang et al. with Lipton to obtain the invention specified in claims 27-29.

58. Claim 30 is rejected with the rationale of claims 27-29. Claim 30 recites limitations similar in scope to claims 27-29.

59. Claims 31-39, and 44-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,031,564 to Ma et al in view of U.S. Patent No. 6,266,068 to Kang et al. in view of U.S. Patent No. 6,765,568 to Swift et al. in view of U.S. Patent No. 5,973,831 to Kleinberger et al.

60. With regard to claims 31 and 32, Ma et al. discloses creating "a method for providing depth accurate three-dimensional images converted from two-dimensional images (*lines 65-67 of column 2: "Stereoscopic images require two slightly offset perspective images in order to create a stereoscopic presentation with the appearance of depth."*), comprising: receiving or accessing

image data (*Fig. 1*) created by using depth information (*lines 20-25 of column 5*) associated with a three-dimensional image (*lines 8-11 of column 3: "A system of techniques of shifting and warping objects within the first image can be implemented to automate the generation of the second perspective image."*); using the image data to reproduce a three dimensional image (*lines 30-31 of column 7: "Finally, the sequence of stereoscopic images is displayed at step 70."*).

61. Ma et al. does not disclose "the three-dimensional conversion information includes hidden surface reconstruction information." Kang et al. discloses "hidden surface reconstruction information associated with hidden surface areas in the three-dimensional image" (*lines 16-25 of column 9: "As with IBR of a single input layer, multiple layer IBR may produce gaps of unspecified pixel values in the output virtual view 120. Such gaps may result from disocclusion (i.e., previously occluded object portions become visible in the new output virtual view) or from mapping pixels from small pixel areas to large pixel areas..."; lines 47-53 of column 9: "For gaps resulting from disocclusion, the correct layer for providing each missing pixel value needs to be determined from the set of input layers because the missing pixel values are not available from the composite images. In one embodiment, an epipolar search process is applied to each input layer in the set of layers to find the correct layer for providing a missing pixel value."*).

62. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate hidden surface reconstruction information as taught by Kang et al. in the system and method disclosed by Ma et al. The motivation for doing so would have been to improve the aesthetic quality of the final image. Therefore, it would have been obvious to modify Ma et al. with Kang et al. to obtain the invention specified in claims 31 and 32.

63. Ma et al. and Kang et al. does not expressly disclose scaling hidden surface area reconstruction information. Swift et al. discloses scaling image data associated with a three-dimensional image to control exaggerated depth effects caused by changes to the size of the three-dimensional image by preserving perceived depths of objects or other image components within the three-dimensional image when the three-dimensional image is presented at a particular screen size, multiple screen sizes, or within a particular range of screen sizes (*lines 53-63 of column 8; lines 6-12 of column 6*).

64. With regard to claims 31 and 32, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to appropriately scale the depth information disclosed in Ma et al. and hidden surface information disclosed by Kang et al. according to a display size as taught by Swift et al. to obtain the advantage of preserving proper stereo under different viewing conditions.

65. With regard to claims 31-35, the combination of Ma et al., Kang et al. and Swift et al. does not expressly disclose a "home theatre environment," "video display," "television," "television-type display," or "a television-type home video display," as recited in claims 31 through 35, respectively.

66. With regard to claims 31-35, Kleinberger et al. discloses displaying a three-dimensional image on "home theatre environment," a "video display," "television," "television-type display," and "a television-type home video display" (*lines 51-59 of column 18: "Thus, according to the first embodiment of the present invention, perception of depth is obtained while displaying a series of frames each including a right and a left image, each pair of images is viewed in the manner described, the frames succeeding each other over time in a traditional manner of motion*

pictures, so as to produce a stereoscopic 3D-motion picture requiring no special optical apparatus beyond conventional means for displaying images (e.g., a television or a computer screen)."; lines 58-61 of column 22: "The system is thus provided, for example, together with sets of 3D-video tapes, and could then be used together with any standard television.").

67. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a television as taught by Kleinberger et al. to display the three-dimensional images created by system and method disclosed by the combination of Ma et al., Kang et al. and Swift et al. The motivation for doing so would have been to display three-dimensional images associated with movies or feature films, as well as to obtain the advantage of the wide availability of television. Therefore, it would have been obvious to further combine Kleinberger et al. with the combination of Ma et al., Kang et al. and Swift et al. to obtain the invention specified in claims 31-35.

68. With regard to claims 32 and 36, Kleinberger et al. discloses displaying a "three-dimensional image on" a "video display," wherein the video display is "a computer monitor" (*lines 51-59 of column 18: "...so as to produce a stereoscopic 3D-motion picture requiring no special optical apparatus beyond conventional means for displaying images (e.g., a television or a computer screen)."*)

69. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a computer screen as taught by Kleinberger et al. to display the three-dimensional images created by the method disclosed by the combination of Ma et al., Kang et al. and Swift et al. The motivation for doing so would have been to enable the viewer and user to interact with the content, in a video-game computer application or Internet browser executed web-site content.

Therefore, it would have been obvious to further combine Kleinberger et al. with the combination of Ma et al., Kang et al. and Swift et al. to obtain the invention specified in claims 32 and 36.

70. With regard to claim 37, the combination of Ma et al., Kang et al. and Swift et al. discloses the limitations recited on lines 1-8 of claim 37, as shown with regard to claim 32. With regard to claims 37, 44, 45, 46, and 47, the combination of Ma et al., Kang et al. and Swift et al. does not expressly disclose "recording the image data on a data storage device such that the data storage device can be used to reproduce the three dimensional image on a video display, television, television-type display, or television-type home video display." With regard to claims 37, 44, 45, 46, and 47, Kleinberger et al. discloses "recording the image data on a data storage device such that the data storage device can be used to reproduce the three dimensional image on a video display, television, television-type display, or television-type home video display (*lines 58-61 of column 22: "The system is thus provided, for example, together with sets of 3D-video tapes, and could then be used together with any standard television."*), as recited in claims 44, 45, 46, and 47, respectively.

71. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a 3D-video tape as taught by Kleinberger et al. to store the three-dimensional images created by the method disclosed by the combination of Ma et al., Kang et al. and Swift et al. The motivation for doing so would have been to obtain the advantage of viewing the content created by the system without having to recompute the images or modify existing widely available equipment to perform the computations. Therefore, it would have been obvious to

further combine Kleinberger et al. with the combination of Ma et al., Kang et al. and Swift et al. to obtain the invention specified in claims 37, 44, 45, 46, and 47.

72. Claim 38 is met by the combination of Ma et al., Kang et al., Swift et al. and Kleinberger et al., wherein Kleinberger et al. discloses "the data storage device is a movie storage device suitable for use in movie theatres" (*lines 58-61 of column 22*).

73. With regard to claim 39, the combination of Ma et al., Kang et al., Swift et al. and Kleinberger et al. fails to teach "the data storage device is a server." Official Notice is taken that both the concept and the advantages of "a server" are well known and expected in the art. It would therefore have been obvious to include "a server" as the data storage device in the combination of Ma et al., Kang et al., Swift et al. and Kleinberger et al. as servers are known to provide mass storage for use by clients with less storage capacity, thereby eliminating the need to duplicate a large amount of data in a plurality of client devices.

74. Claims 37 and 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,031,564 to Ma et al. in view of U.S. Patent No. 6,266,068 to Kang et al. in view of U.S. Patent No. 6,765,568 to Swift et al. in view of U.S. Patent No. 6,198,484 to Kameyama.

75. With regard to claims 37, 41, 42, and 43, the combination of Ma et al., Kang et al., and Swift et al. discloses the limitations recited on lines 1-8 of claim 37, as shown with regard to claim 32. The combination of Ma et al., Kang et al., and Swift et al. does not disclose a "digital storage device." Kameyama discloses storing a three-dimensional image data on a data storage device wherein the data storage device is a digital media disk, digital versatile disk, and a data storage device that can be used to reproduce the three-dimensional image with a digital projector

as recited in claims 41, 42, and 43, respectively (*lines 41-48 of column 25: "In this example, image conversion is performed with each scene by the image operations means 35. By storing on a storage medium, such as a DVD, image data that have been subjected to image conversion in advance by the stereoscopic condition calculation section of this system, the image data create means 20 can produce images that provide easy stereoscopy without the use of the stereoscopic condition calculation section.*").

76. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use digital media storage as taught by Kameyama to store the three-dimensional image data in the combination of Ma et al. and Swift et al. system. The motivation for doing so would have been computational efficiency, as suggested by Kameyama in lines 41-48 of column 25. Therefore, it would have been obvious to further modify Ma et al., Kang et al., and Swift et al. with Kameyama to obtain the invention specified in claims 37, 41, 42, and 43.

77. Claims 37, 40 and 48-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,031,564 to Ma et al in view of U.S. Patent No. 6,266,068 to Kang et al. in view of U.S. Patent No. 6,765,568 to Swift et al. in view of U.S. Patent No. 5,495,576 to Ritchey.

78. With regard to claims 37, 40 and 48, the combination of Ma et al., Kang et al., and Swift et al. discloses the limitations recited on lines 1-8 of claim 37, as shown with regard to claim 32. The combination of Ma et al., Kang et al., and Swift et al. does not expressly disclose storing the three dimensional images on a data storage device. Ritchey discloses storing three dimensional images on a data storage device wherein the data storage device is a hard drive" (*lines 7-9 of column 16: "...generated images, and the like are stored in mass storage devices which may*

include magnetic disk drives, optical disk drives, and so forth..."; 25a shown in Fig. 1). One of ordinary skill in the art would recognize that a hard drive is a storage device that inherently can be used to reproduce the three-dimensional image on a computer monitor, as recited in claim 48.

79. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a hard drive as taught by Ritchey to store the images created by the method disclosed by combination of Ma et al., Kang et al., and Swift et al. The motivation for doing so would have been to gain the advantage of computational efficiency by storing computations for future access in a real-time computer graphics applications such as those disclosed by Ritchey in lines 19-25 of column 15. Therefore, it would have been obvious to further modify the combination of Ma et al., Kang et al., and Swift et al. with Ritchey to obtain the invention specified in claims 37, 40 and 48.

80. With regard to claims 49 and 50, the combination of Ma et al., Kang et al., and Swift et al. discloses the limitations recited on lines 1-8 of claim 49, as shown with regard to claim 37. The combination of Ma et al., Kang et al. and Swift et al. does not expressly disclose, "using an electromagnetic transmission medium to transmit image data." Ritchey discloses displaying a three-dimensional image (*Fig. 1 118 and 119*) "using an electromagnetic transmission medium to transmit image data" wherein the "electromagnetic transmission medium includes radio waves" (*Fig. 24 shows transmission of image data to an system 2 (shown in Fig. 1) to display a three-dimensional image 118 and 119; lines 52-54 of column 33: "An over the air radio frequency digital communications system 226 transmits 1000 to one compressed full color signals at a 60 hertz data transmission rate."; 110*).

81. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use an electromagnetic transmission medium to transmit image data as taught by Ritchey in the system disclosed by the combination of Ma et al., Kang et al., and Swift et al. The motivation for doing so would have been to support remote operation of a vehicle as suggested by Ritchey in lines 16-17 of column 34. Therefore, it would have been obvious to combine Ritchey with the combination of Ma et al., Kang et al. and Swift et al. to obtain the invention specified in claims 49 and 50.

82. Claims 51 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,031,564 to Ma et al. in view of U.S. Patent No. 6,266,068 to Kang et al. in view of U.S. Patent No. 6,765,568 to Swift et al. in view of U.S. Patent No. 6,496,598 to Harman.

83. With regard to claims 51 and 52, the combination of Ma et al., Kang et al., and Swift et al. discloses the limitations recited on lines 1-8 of claim 51, as shown with regard to claim 37. The combination of Ma et al., Kang et al. and Swift et al. does not disclose, "using a communications network to transmit the image data." Harman discloses "using a communications network to transmit the image data," wherein "the communications network includes the Internet" (*lines 15-16 of column 16: " Module 4 provides for the transmission and/or storage of the stereoscopic images... 3) Digital Network—INTERNET, etc..."*).

84. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use digital network as taught by Harman to store the three-dimensional image data in the method disclosed by the combination of Ma et al., Kang et al. and Swift et al. The motivation for doing so would have been to provide a widely available distribution means for the image

data, an advantage of the Internet well known in the art. Therefore, it would have been obvious to further modify the combination of Ma et al., Kang et al., and Swift et al. with Harman to obtain the invention specified in claims 51 and 52.

Response to Arguments

85. Applicant's arguments with respect to the rejection of claim 6 under Ma et al. and Swift et al. have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection for 6-10, 12, 13-17, 23, 25-52 is made in view of Kang et al. Applicant's arguments with respect to the remaining claims have been considered but are moot in view of the new ground(s) of rejection. Arguments pertaining to the new grounds of rejection are addressed.

86. Applicant's arguments with respect to the Official Notice are addressed by the inclusion of U.S. Patent No. 6,005,607 to Uomori et al.

87. In response to Applicant's arguments regarding claim 17, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Yosefi et al. is at least pertinent to the particular problem of image processing which is utilized in methods that provide three-dimensional images. At the time of the invention, one of ordinary skill in the art would have looked to other applications of computer graphics and image processing beyond teachings solely directed to creating stereoscopic images.

88. In response to Applicant's arguments regarding claim 16, it is noted that the features upon which applicant relies are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The cited portion of Swift et al. deals with scaling up an image, which operates on a lower resolution image and produces a higher resolution image to be used as output.

89. In response to Applicant's arguments regarding claim 27-52, the secondary references relied upon for these rejections need not disclose all of the claimed features, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); In re Merck & Co., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Specifically, the Lipton system discloses a stereoscopic system and was relied upon for specific teachings that pertain to viewing. Kleinberger et al. teaches displaying a three-dimensional image on "home theatre environment," a "video display," "television," "television-type display," and "a television-type home video display." Kleinberger et al. was relied upon for specific teachings that pertain to methods of presentation." Kameyama discloses storing a three-dimensional image data. Ritchey discloses storing three-dimensional images on a data storage device wherein the data storage device is a hard drive. Harman discloses "using a communications network to transmit the image data," wherein "the communications network includes the Internet." All references are submitted as being pertinent to the particular problem being solved. The test for obviousness is not that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test

is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Conclusion

90. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent No. 5,907,364 to Furuhata et al. discloses a distribution and display system for stereographic content. U.S. Patent No. 6,456,340 to Margulis discloses a system that performs transformations on the image data to "compensate for the characteristics of the display system." U.S. Patent Nos. 5,801,760, 5,726,704 and 6,005,607 to Uomori et al. discloses a stereoscopic image-generating device that considers the display size. U.S. Patent No. 6,011,581 to Swift et al. discloses a stereoscopic display system that considers the display size.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Repko whose telephone number is 571-272-8624. The examiner can normally be reached on Monday through Friday 8:30 am -5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on 571-272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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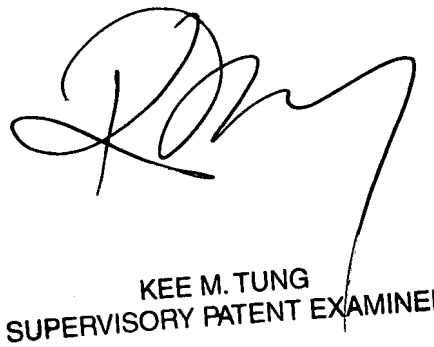

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